Belief in Lunar Effects

THESIS

Presented In Partial Fulfillment of the Requirements for

The Masters of Special Education Degree in the

College of Education and Human Service Professions

By

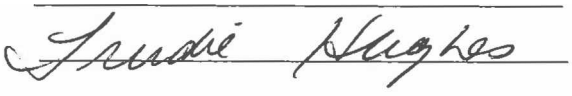
Crystal Scuffy

University of Minnesota Duluth

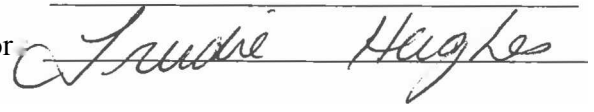
2011

Committee Signatures:

Chair

Member 

Member

Graduate Program Director 

DEDICATION

To my husband for understanding that sometimes things take time. To my family, for the encouragement and support to get it done. To the staff at UMD, for pushing me to excel in my education. And to my father, who passed away during my time working on my Masters, but who I know is so proud of my accomplishment.

TABLE OF CONTENTS

CHAPTER ONE

Introduction

Why is there a widespread belief among social service personnel that when the moon reaches its fullness every month, that the "crazies" will be out and "bad" behavior will escalate with above-average numbers? Otis and Kuo (1984). Lunacy is derived from *luna,* the Latin word for moon, and people are aware of the many deviant, abnormal, and peculiar behaviors attributed to the moon: alcoholism, madness, epilepsy, sleepwalking, suicide, homicide, and arson. Despite advances in medicine there are still some people with the misconception of the wives' tale of the full moon lunar hypothesis that will not go away despite years of evidence that shows no significance between the full moon and behavior. These beliefs continue to provide us with a sense of control and understanding within our environments. Lieber (1978) stated that, "Belief in the power of the moon to influence human behavior is not a superstitious practice of silly people. It is the formed opinion of experienced professionals who work with the public." (Lieber, 1978, p.3-4). Most people are able to read the literature and see the results of no significance and causes of mere superstition, but some come to the defense based on their own casual observations. The question then lies with the general public and not the scientists who continue to argue the specifics of the failed significant tests, why do we continue to say the full moon effects behavior?

Purpose

This project will study the extent to which individuals working in different social service settings believe in the lunar effect by use of the Belief in Lunar Effects (BILE) instrument. This nine-item survey quantifiably measures the degree to which individuals believe or disbelieves in the lunar effect by adding up their responses to give a BILE score. It will also determine whether

there is significant difference in the BILE scores between the different social service setting groups. A survey combining the BILE instrument with a qualitative aspect, in which participants are given space to include their opinions on the subject will also be employed. The combination of qualitative and quantiative methods employs triangulation which strengthens the confidence in the findings, therefore increasing the validity of the results of the small scale research. Respondents demograhic information will be gathered as well. The separate settings were chosen based on their location radius to the researcher.

Background and Significance

Surprisingly little is known about the extent and depth of lunar beliefs. Dingman, Cleland, and Swartz (1970) found that 4% of the attendants in a mental institution spontaneously mentioned the full moon as a cause for aberrant behavior. This behavior ranged from fighting, creating a disturbance, verbal and physical assaults, escape, fire, psychiatric disturbances, and unusual medical problems. Russell and Dua (1983) found that 45% of 402 students taking introductory psychology at a Canadian university endorsed an item indicative of general belief in lunar influences. The women were a mean age of 20.37 years and the men were 20.16 years. They were asked the question: “The full moon has no effect on human behavior” as part of a filler question item in the context of an unpublished project. Koenig, Proverbs, Clayton, and DeBeck (1979) conceded that the belief in the effects of the full moon might act as a self-fulfilling prophecy. Seeking an excuse for their irrational behavior, the individual might blame it on the moon. Although this version of the self-fulfilling prophecy has not been tested, Angus (1973), examined relations between lunar beliefs and vigilance in a psychiatric settings. Nurses in Angus’s study were assigned to five groups on the basis of their responses to a scale that assessed their belief in lunar effects. When Angus later examined ward notes, she found that the

nurses who believed in lunar influences were no more likely to record unusual occurrences on full-moon nights than those who did not believe in lunar effects. Kelly's (1967) attribution theory explains that humans attempt to understand, predict, and control events. For example, in a crisis center setting the actual number of calls is unpredictable. This unpredictability might cause uncertainty and anxiety when working. The belief that an individual, to some extent, can predict the occurrence of crisis calls might provide the worker with greater perceived control and reduce the uncertainty and anxiety while working. Thus, the belief that crisis center calls are correlated with lunar phases might provide a greater sense of understanding, prediction, and control (Wilson & Tobacyk, 1990). Rather than rely upon self-fulfilling prophecy or other theories, advocates of the lunar hypothesis have attempted to link phases of the moon to a number of environmental factors including moonlight, weather, gravity, electromagnetic forces, and air ions (Rotton and Kelly, 1985).

In 1978, Campbell and Beets concluded that "lunar phase is not related to human behavior" (p. 1123). Since then people have continued to try to discredit the myth and show positive evidence for correlations in human behavior and lunar phases. Researchers went back and forth over what could or could not be the reason for a positive correlation. Those few instances in which positive results have been reported are seen as likely examples of Type I errors. Rotton, Kelly, and Frey (1983) report the Chi-square method was most often used statistically in these studies. Those results may seem biased when observations are correlated over time. It is believed to be inappropriate in this area of research because independence between measures or events is often violated. They recommended using time series analysis to detect lunar periodicities with analyses in both frequency and time domains. (Rotton, Kelly, and Frey, 1983). Variables also played a role in determining significance. Many of the studies

observing lunar effects on crime rates, suicides, or in-patient admissions were conducted in urban, densely populated areas. This resulted in confounding variables in the studies. Many of the studies also did not take into account the plethora of independent variables that affected the results. The researchers in individual studies each had different definitions as to when they defined the full moon time period as. Some researchers included only the day of the full moon, others did the days prior and after, while still others included two days prior and after the full moon as the full moon period. Another independent variable was the description of the behavior. For example, researchers varied their definitions of behavior with extreme behavioral changes prior to hospitalization, or the number of incidents of violent behavior, or even more direct psychotic disturbances. Some researchers only looked at those patients who were admitted to psychiatric hospitals, while some areas did not have access to psychiatric hospital so used a general hospital admission first. Lastly, many of the studies varied in their methods of statistical analysis and did not account for non-controlled variables. Some of the subjects may not have been under the direct observation and might not have been brought to the attention of the authorities who kept such records. Criminal activity could also have overlapped with seasonal and weekly variations throughout a calendar year.

In 1985, Rotton and Kelly published their findings from a meta-analysis on data from 16 different empirical reports. The meta-analysis covered a few statistically significant relations between phases of the moon and behavior, but it could not be concluded that people behave any more or less strangely during one phases of the moon than another. They concluded that the moon accounted for no more than 1% of the variance in activities usually termed lunacy (Rotton & Kelly, 1985). This is not the same as saying that there is not a relation between phases of the moon and behavior. Just as we cannot prove that werewolves, unicorns, and other interesting

creatures do not exist, we cannot prove that the moon does not influence behaviors. The burden of proof is up to those individuals that truly believe in the lunar hypothesis. It is not sufficient anymore to show that lunacy is more likely to occur during full phases of the moon than the other phases as previous folklore and superstition anticipated. They are the ones who will have to collect and analyze much more robust data before the null hypothesis of no relationship between the phases of moon and behavior exists. Unfortunately, the lunar hypothesis is so broad that it can endure any result.

Setting

This study will take place through the use of a questionnaire distributed to six different settings. These settings will consist of: 9-1-1 dispatch center, elementary school, residential juvenile facility, nursing home, emergency room, and police station. This study will be conducted at facilities that are within a 30 mile radius of the researcher's home, which provides similar community values and norms for the professional groups selected. This geographical limitation will provide a better basis for comparison of the groups.

Assumptions

Having taught in five different public school systems over the past ten years, I have heard countless times that the reason for misbehavior was due to a full moon. Based on my experiences, the students are more talkative, restless, and need more directives to settle down. When the teacher’s gather in the hall after school on particular days, it is the consensus of the group of teachers that it must be a full moon due to the increase in unruly type behavior that has been displayed that day. The first assumption is that I believe that when there is a full moon the behavior of students escalates more than normal. Throughout the years when I have shared with

people in conversation that I am a teacher, they often have shared their occupation with me as well. It is during these conversations that somehow we come to talk about above-average non-normal behavior incidents during full moon phases. It is my second assumption that other people working in social service settings also believe that the full moon effects behavior. My third and final assumption comes from working in a residential facility. I found that the number of behavioral incidents increased on or around full moon days compared to non-full moon days. My experience in that setting provided an increase in aggressive and sexual behaviors such as threats, physical altercations, and sexually acting out amongst the clients. My third personal assumption is that even when you isolate certain independent variables, such as in a residential setting, there is still a belief that there is an increase in above-average behavioral incidents.

Definitions

BILE -Belief in Lunar Effect instrument. This nine-item survey instrument, developed by Rotton and Kelly (1985), quantifiably measures the degree to which an individual believes or disbelieves in the lunar effect by adding up their responses to give a BILE score. Respondents circled a number from 1-9 where 1 represented strong disagreement, 5—a neutral opinion and 9~strong agreement with the statement. BILE scores were produced for each participant by adding up responses to the BILE test questions and a score assigned. A total of 45 indicated impartial belief, 9-26 strong disbelief, 27-44 disbelief, 46-63 belief and 64-81 strong belief in the lunar effect.

'Illusory correlation' defines the report by observers of the correlation of two classes of events which, in reality, are not correlated at all, or are correlated to a lesser degree or even in the opposite direction than reported (Chapman 1967).

Lunar effects is the increase in any of the following but is not limited to: homicide rates, traffic accidents, calls to police, calls to fire stations, domestic violence, births, suicide, major disasters, casino payout rates, assassinations, kidnappings, prison violence, psychiatric admissions, or a rise in behavior by nursing home residents.

Lunar hypothesis is a hypothesis suggesting that there is correlation between specific stages of the Earth's lunar cycle and deviant behavior in human beings.

Moon's Phases-The lunar month is the 29.53 days it takes to go from one new moon to the next. During the lunar month, the Moon goes through all its phases. You can see the phases drawn in the image below. Just like the Earth, half of the Moon is lit by the Sun while the other half is in darkness. The phases we see result from the angle the Moon makes with the Sun as viewed from Earth.

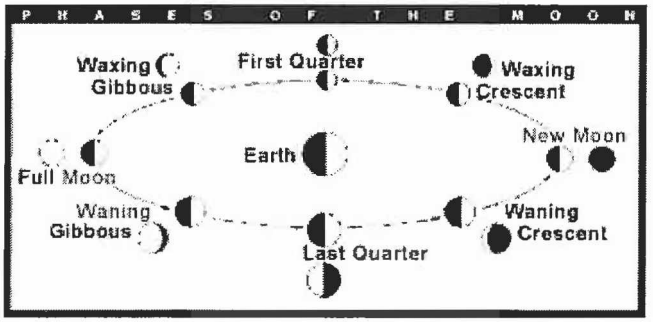
At new moon, the Moon is lined up between the Earth and the Sun. We see the side of the Moon that is not being lit by the Sun (in other words, we see no Moon at all, because the brightness of the Sun outshines the dim Moon). When the Moon is exactly lined up with the Sun (as viewed from Earth), we experience an eclipse.

As the Moon moves eastward away from the Sun in the sky, we see a bit more of the sunlit side of the Moon each night. A few days after new moon, we see a thin crescent in the western evening sky. The crescent Moon waxes, or appears to grow fatter, each night. When half of the Moon's disc is illuminated, we call it the first quarter moon. This name comes from the fact that the Moon is now one-quarter of the way through the lunar

month. From Earth, we are now looking at the sunlit side of the Moon from off to the side.

The Moon continues to wax. Once more than half of the disc is illuminated, it has a shape we call gibbous. The gibbous moon appears to grow fatter each night until we see the full sunlit face of the Moon. We call this phase the full moon. It rises almost exactly as the Sun sets and sets just as the Sun rises the next day. The Moon has now completed one half of the lunar month.

During the second half of the lunar month, the Moon grows thinner each night. We call this waning. It's shape is still gibbous at this point, but grows a little thinner each night. As it reaches the three-quarter point in its month, the Moon once again shows us one side of its disc illuminated and the other side in darkness. However, the side that we saw dark at the first quarter phase is now the lit side. As it completes its journey and approaches new moon again, the Moon is a waning crescent.



Source: The National Aeronautics and Space Administration (NASA)

Self-fulfilling prophecy is when you seek an excuse for irrational behavior and the individual may blame it on the moon (Koenig, Proverbs, Clayton, and DeBeck 1979).

Synodic cycle is the time it takes for the Moon to complete one cycle of phases. For example, the time it takes the Moon to complete one full cycle of phases. That is, the time between successive new moons. Therefore, the synodic month is measured with respect to the Sun and is approximately 29.5 days.

Summary

For almost a hundred years, scientists have been trying to prove or disprove the lunar theory and its effect on people's behavior. Two bodies of research have arisen as a result, one of which relates to empirical research aiming to establish the validity of this theory, while the second is concerned with the extent to which this belief is held. The finding of the majority of the studies does not support a relationship between lunar phase and the measured behavior in relation to different types of lunar effects. Empirically research has been criticized essentially due to the inconsistencies among the studies relating either to the measurement of independent variable (the lunar phase) or to the dependent variable (the behavioral data chosen to measure lunacy). Since the majority of lunar research relies on the application of statistical tests to an undefined and non-specific process, it is impossible to design a lunar study which will yield results in which any confidence can be placed. Studies done concerning the lunar effect display a correlation between a variable and where if falls within the defined lunar cycle and are given a wide range for the purpose of data collection and interpretation. Many studies cite that since an event occurred on the day after a full moon, then it must be related to this point within the lunar cycle. This research flaw illustrates when an "effect" is truly never defined. This in turns gives the researcher the ability to find relationships based on data that is gathered and applied using a wide definition of categories (Dowling, 2005). Strong beliefs held are likely to be persistent,

even in the face of evidence to the contrary. Insofar as beliefs create expectations, the implications for interpersonal relations are clear. For example, among particular social service occupations (police, prison guards, or hospital staff) a widespread and prominent belief/expectancy that antisocial behavior is somehow prompted by the full moon may bring about that very behavior through the operation of a self-fulfilling prophecy. Needless to say, investigators holding strong beliefs about lunar influences may themselves fall prey to expectancy effects (Rosenthal, 1969). Attribution theory states that a belief that occurrence of crises can be predicted provides individuals with feelings of control which reduce anxiety (Kelley, 1967). Therefore, the belief that the incidence of crises is correlated with lunar phases provides the worker with a sense of control and alleviates anxiety (Wilson & Tobacyk, 1990). Once the variable of observational skewing and the reporting of the data have been accounted for, it is obvious that there is no relationship between lunar cycles and behavioral incidents. Past studies that have supported the idea have failed to take into account the human aspiration to find recognizable patterns in our experiences and to be in control within an otherwise hectic world.

CHAPTER TWO

Literature Review

Is the belief in the full moon affecting behavior ridiculous or does it warrant the research of scientists and psychologists because so many people believe in it? In 1978, Campbell and Beets concluded that "lunar phase is not related to human behavior." This project will study the extent to which individuals working in different social service settings believe in the lunar effect by use of the Belief in Lunar Effects (BILE) instrument. This nine-item survey quantifiably measures the degree to which individuals believe or disbelieves in the lunar effect by adding up their responses to give a BILE score. It will also determine whether there is significant difference in the BILE scores between the different social service setting groups. A survey combining the BILE instrument with a qualitative aspect, in which participants are given space to include their opinions on the subject will also be employed. The combination of qualitative and quantiative methods employs triangulation which strengthens the confidence in the findings, therefore increasing the validity of the results of the small scale research. This review will first examine theories that have tried to disprove the lunar hypothesis. Next, the numerous studies throughout the years that have not found significance in lunar effects and behavior will then be discussed. Finally, the results of other research conducted with beliefs in lunar effects will be summarized.

Discrepancies in Previous Research

During the full moon phase, common belief is that such forces as gravitational pull (which creates physical and psychological effects) and greater luminance of the moon (for better visibility at night which would facilitate antisocial behavior) are more responsible for the influence on human behavior. As Gardner (1981) reported, the earth has a gravitational pull more than 5,000 times greater than the moon and the luminance during the full moon phase is only one

fourth that of a candle, and one seventieth of a 100-watt light bulb. Psychiatrist Charles Raison of the University of California at Los Angeles believes he has the answer to how the lunar hypothesis has been able to survive as long as it has. He argues that the lunacy myth is a "cultural fossil"-a memory of a time when the moon really did have a behavior-altering power that it has since lost. What's changed in modem times, he says, is the importance of the moon as a source of nocturnal illumination. In the days before gas lamps and electric lights, when candles were an expensive luxury, a moonlit night gave people an opportunity to do all sorts of things-plow, hunt, or travel, for instance, that they normally would not have been able to do because of lack of luminance. In the three days around the full moon, lunar light is 12 times stronger than at half full. Overall, people stayed up later and slept less during the full moon than at other times of the month, Raison argues. Here at last is a probable link between the moon and behavior. Sleep deprivation over a single night can induce mania, Raison says, even in healthy people. Epileptic fits can also be provoked by sleep deprivation, and may once have been blamed on the harmful influence of the moon. Raison's theory also explains why lunar influences are so hard to prove today. He suspects that artificial lighting mask any effects the moon used to exert on the way we behave. There is already evidence that artificial lighting in towns and cities suppresses changes in circadian rhythms, including the release of melatonin. Wehr (1992) and his colleagues at the National Institute of Mental Health in Bethesda, Maryland, found that men living in Washington, DC showed none of the predicted seasonal changes in body chemistry. The highly lit urban environment blocks the body's response to seasonal changes in the hours of daylight. If artificial lighting can do that, it can surely mask any impact of moonlight. Even the brightest full moon can't compete with sitting near a 100-watt light bulb.

As far back as Sarton in 1939, there is a mention of possible artifact of the higher

occurrences of crisis situations during the lunar cycle, the belief of many service providers in such a relationship. As a result, a heightened awareness and hence higher monitoring and reporting of problematic behaviors and emergency situations could account for the belief in higher rates of emergency during the lunar cycle (Gorvin & Roberts, 1994). Culver, Rotton, and Kelly (1988) addressed the question of the lunar theory from a comprehensive scientific approach. They reviewed various geophysical variables and their effects on human behavior using information from many different scientific disciplines such as astronomy, biology, and physics. The lunar theory is based in large part on the concept that when the moon is at its fullest, it excerpts the greatest amount of gravitational pull on the earth and the physiology of those who live on it. This in turn, would have an impact on behavior. Their explanation of the science behind this claim clearly shows that the phase of the moon has nothing to do with its gravitational pull on our planet. The point at which the moon is closest to the earth can occur during a full moon, new moon, or at any point between these phases. These two variables of lunar phases and gravitational pull are not related and should not be assumed in any studies like it has been in so many in the past.

There has also been variability in defining the independent variable, the phase of the lunar cycle most likely to cause an increase in behavioral emergencies. Some research uses a broad definition of the most active lunar phase (three days before/after the full moon - a term referred to as lagging), yet it still does not yield a significant relationship. In any case, there are alternative explanations to any apparent inconsistencies in the overall research. Critics should be aware that inconsistent results may be a result of the different data selected and their sources, different ways of defining the lunar phases, the geographical location of the subjects, or the sample size. Inconsistences can also arise from the nature and classification of the human

behaviors at stake, the year of the study, the coincidence with other potent variables that were not controlled (day of week or holidays), and the undetected (unknown and uncontrolled) cosmic and/or terrestrial forces related to lunar phases. All this is to say that lunar-effects research on human behavior is at a primitive level of development. In this state of development, non-significant findings should not discourage the researchers and may be viewed as the early failures to yet discover the valid laws of nature.

Insignificant findings in data on lunar effects

Another argument against finding significance to support the lunar hypothesis has been discussion of the full moon phases overlapping with weekends or holidays and therefore affecting the data to show significance. Owens, Tarantello, Jones, and Tennant (1998) gathered data prospectively for 105 weeks across five psychiatric hospitals by use of a 'violence and aggression checklist,' which allowed a tabular entry of all violent and aggressive incidents observed by staff using Morrison's classification scheme. This is an eight-point scale ranging from 'exhibited low grade hostility' to 'inflicted serious harm requiring medical care' with validated levels of escalating violence and aggression. Comparison rate of violent incidents across the four quarters of the lunar cycle was made using Poisson regression. Poisson regression is a regression type statistical model appropriate when the outcome of interest is a count (e.g. number of violent incidents) and further allows the consideration of the time period at risk for the incidents to occur. The model reports the influence of one or more risk factors in terms of the relative rate of violence incidents; hence a relative rate of 2.0 would indicate a doubling of the rate of violent incidents. The number of violent incidents was assumed to arise from a Poisson process and normalized according to bed occupancy as a measured of population at risk. All incidents of violence and aggression were recorded on an eight-point scale and lunar phases

noted. Using the full moon as the reference category and normalizing by bed occupancy, there was a linear trend of increasing violence across the four lunar phases that did not reach significance. After controlling for extraneous temporal variation (using weekends and public holidays), similar relative rates to the unadjusted data were obtained showing no significant effect on violence. The final hypothesis examined the modifying effect of weekends and public holidays on the lunar cycle pattern of violence. There were no significant modifications of lunar phase patterns by weekends and public holidays. Poisson regression was then used to examine the effect of the lunar cycle on each level of aggression. There were no significant changes to the pattern of each level of aggression across the lunar cycle. The results of this study provide very little support for any commonly held beliefs about the effects of the moon upon behavior.

Frey, Rotton, and Barry (1979) examined the relationship between lunar cycles and 14 types of crimes and emergencies in Dayton, OH over a two year period in terms of four types of lunar cycles. The data consisted of phone calls made by individuals to the police and fire departments for various offenses. Calls were then grouped together with the aid of a lunar phase calendar to make four separate groupings, which were meant to overlap one another. The results of this study provided very little support for commonly held beliefs about the effects of the moon upon behavior. Instead, they are consistent with the idea that effects attributed to the moon are Type I errors due to the fact that a significant relationship between phases of the moon and behavior can occur by chance alone. In addition, Rotton and Kelly (1985) have explained that studies that use a large number of phase window analysis on lunar data will attain significance by chance alone. Convention leads authors to report statistically significant finding, but 50 out of 56 tests conducted in this study failed to attain significance, two did so because of overlapping analyses. With tongue and cheek, the authors agreed that a full moon might affect the behavior of

some individuals.

Little, Bowers, and Little (1987) conducted a study on over 400 male inpatient clients over a span of 6 years. This study was conducted in a prison treatment housing unit operated and staffed 24 hours a day. The unit's staffs were required to complete incident report forms on all clients who exhibited disruptive or violent behavior, threats, psychiatric disturbances, escape, fires, and any unusual medical problems. Throughout the time span, a total of 364 incident reports were filed. The researchers used a moon phase ephemeris (a collection of tables to determine moon phase data) and the precise synodic moon phase (full moon, new moon, first quarter, or third quarter) was established for each reported incident. The number of incidents occurring during the full moon was 83, new moon was 95, first quarter was 88, and third quarter was 98. As a result of the data being gathered over six consecutive years, the researchers assumed it was unnecessary to correct for holidays or weekends. These results indicate that there was no obvious link between synodic moon phase and incidents of disruptive and violent behavior in inmates with mental health problems at this particular facility. The researchers believed that the counselors' expectations, beliefs, and selective perception appear to account for the belief in the lunar hypothesis.

Numerous other studies have also debunked the lunar hypothesis. Cohen-Mansfield, Marx, and Werner (1989) studied the relationship between the occurrence of a full moon and manifestations of a variety of agitated behaviors that were not the by-products of a medical condition in 24 nursing home residents. They chose residents based on their level of high agitation and high cognitive impairment. They observed over a three month period, with the data being broken down into new moon, first quarter, full moon, and last quarter as determined by the Jewish calendar, which is based on the lunar cycle. They were unable to prove their hypothesis

that agitated residents become increasingly agitated during a full moon. Agitation generally was observed less frequently when the moon was full than during other lunar phases.

In 1996, Thompson and Adams analyzed all the patient visits to a 400-bed community hospital that was one of Chicago's Level II trauma centers. During a four-year period no effect of the full moon was discovered on the Emergency Department's patient volume, the number of ambulance runs, general admissions, or admissions to a monitored unit. Also in 1995, Vance used behavioral incident reports filed on patients at a psychiatric care facility to catalog outbursts that were considered inappropriate by an independent reviewer over a 34-month period. The behavior that was noted involved incidents in which clients represented a threat to themselves or others, or were engaged in activities that were uncharacteristically noncompliant. This study indicated that were was no significant correlation between anti-social or violent behavior and the synodic cycle.

It has been nearly impossible to achieve consistent results throughout the years in the continued pursuit of the lunar hypothesis. More recent work has confirmed this assessment and has strengthened the argument that the few studies finding positive correlations between the moon and behavior are so methodologically flawed as to be ruled out as examples of Type I errors. Type I errors are the chance of claiming incorrectly that a correlation between lunar phases and human behavior is reliable and not a coincidence is equal to the reported 'level' of statistical significance. The variables in many of these studies are confounded at several levels (e.g. time of admission, type of behavior, geographic location, etc.). Campbell (1982) and Rotton and Kelly (1985) have suggested that emphasis should instead be placed on replication studies as a basis for deciding the validity of a hypothesis. The difference in data analysis on a hypothesis can be either exploratory or confirmatory. The argument for lagging procedures or massaging the

data, in the lunar hypothesis is to be used only if the goal is to discover and describe relations (e.g. exploratory research and analysis). Then, according to Rotton and Kelly (1985), "nobody can object to lagging" (p.292). On the other hand, if the goal is to test the hypothesis (e.g. confirmatory research and analysis), then Campbell and Beets (1978) are correct in their argument against the inappropriateness of lagging procedures done in lunar research. "If a hypothesis does not hold up under replication attempts that are methodologically similar to the original studies, then doubt should be cast upon the truth of the hypothesized relationship" (Campbell, 1982, p. 420). Campbell (1982) debates the validity of results regarding lunar impact on human behavior with the need for a hypothesis, massaging of the data as acceptable during exploratory work, and calls for looking at replication studies as a basis for deciding the validity of a research hypothesis.

Replication is defined as an additional experiment conducted in which the method of the first experiment is *precisely* repeated in an effort to confirm or disconfirm findings previously obtained whereas confirmation of the original findings may be obtained without replicating a study's method (McGuigan, 1978). The objective of a study is confirmed when a study is designed to evaluate the generalizability of earlier results to different independent variables. Similar to McGuigan's (1978) definition of replication, Lykken (1968) introduced the term "operational replication." With this type of replication, one tests whether findings can be duplicated using the same methods of measurement and samplings. Without a plausible theory of lunar effects that could incorporate such varied positive findings and explain why so many studies using clear operational definitions and large sample sizes yield no effect, there is not a good reason to determine that a relationship exists between moon phases and the behavior of human beings.

Beliefs in lunar effects

Dingman, Cleland, and Swartz (1970) found that 4% of the attendants in a mental institution spontaneously mentioned the full moon as a cause for aberrant behavior. In another study of psychiatric personnel, Angus (1973) found that approximately 74% (64 of out 86) of nurses indicated that they believed that the moon had an effect upon mental illness. 27% (23 out of 86) of those believed that the phases of the moon influence mental illness "quite a lot" or "a lot." This study was based on the ward notes of nurses who worked in a mental health facility. Russell and Dua (1983) found that 45% of 402 students taking introductory psychology at a Canadian university endorsed an item indicative of general belief in lunar influences. The women were a mean age of 20.37 years and the men were 20.16 years. They were asked the question: "The full moon has no effect on human behavior" as part of a filler question item in the context of an unpublished project. They also distributed the survey with the same filler question to 85 males at a Western Hockey League game between periods and found 36.5% of them indicating a belief in lunar influences. They also looked at whether the full moon and aggression were significant. Aggression measures were derived from the official records of Western Hockey League games (n=426). They used three different measures of aggression: (a) the total penalty minutes awarded players for cross checking, slashing, and charging; (b) penalties awarded for fighting and game misconduct; and (c) a combined index of all aggressive penalties awarded during each match. However, evidence of relationship between moon phases and interpersonal aggression was not forthcoming. Similar levels of belief had also been documented among students in another Canadian university and in Singapore (Otis & Kuo, 1984). A questionnaire which included 34 items on extraordinary belief was completed by 113 university students found that Canadian students were significantly more skeptical than Singapore students. These beliefs

dealt with traditional religion, luck, fortune telling, psychic phenomena, spirits, and strange sightings. Canadian students were found to be significantly more skeptical than their Singapore peers and were particularly skeptical regarding religious beliefs about spirits. Both groups shared similar views concerning psychic and other extraordinary phenomena. This study opened up a new avenue for research to compare beliefs amongst cultures and even nations evolving from a traditional to modem society, yet no one has pursued a study this specific.

Throughout the years there have been several scales developed to assess belief in occult paranormal phenomena, but none of them measured belief in lunar influences until Rotton and Kelly designed the BILE (Belief in Lunar Effect) Scale in 1985. The BILE is a nine item statement survey that respondents indicate agreement by choosing numbers between 1 (strong disagreement) and 9 (strong agreement). Rotton and Kelly (1985) conducted a questionnaire on paranormal phenomena and based on the BILE Scale responses of 157 undergraduates, 74 respondents (about 47%) recorded greater belief than disbelief in lunar effects. Item endorsement ranged from over 49% of respondents agreeing that “some people behave strangely when the moon is full”, 33% believed that “a full moon can trigger violence and aggression”, 14% believed that “their own behavior was affected by phases of the moon”, and 5% agreeing that “it is a good idea to stay at home when the moon is full.” It was interesting to note that men and women received almost identical BILE scores. On the other hand, older individuals were more willing to endorse lunar beliefs than were younger ones. They even went as far as to break down the demographics they collected to see if there were relationships between scores on the BILE and the sum of parents’ educational level and scores with the year in which they were in presently enrolled in college. There was no relationship between either of the two. The relationship between age and belief in lunar effects appears to reflect differences between

generations rather than social class or education. Analyses was continued further to determine if individuals from different religious and ethnic backgrounds differ in their willingness to endorse lunar beliefs. They did not show statistical differences in religious affiliation, but a statistical difference was obtained for church attendance. Ethnicity also obtained statistical difference.

Wilson and Tobacyk (1990) also used the BILE survey to measure the perceptions of 87 employees (M age = 37.7 years, SD = 14.9) at a crisis center regarding the beliefs in the lunar effect. They then took their responses and compared them to 102 university students (M age = 21.1 years, SD = 5.5) who did not work for the center. The results indicated that the crisis center workers' beliefs that the moon affected human behavior (M= 26.78, SD = 8.12) were significantly higher than those of the control group of the college students (M=22.32, SD =7.76, $p < .001$) The study pointed out that because of the unpredictability of the crisis center, workers needed to establish some type of control over and predictability within their own environment. It displayed what is commonly referred to as a "illusory correlations." This is the tendency of people to expect a relationship between two variables either to greatly overestimate the degree of relationship that exists or to impose a relationship when none exists (Fiske & Taylor, 1984). By creating this correlation, an individual is able to reduce anxiety and have a sense understanding, prediction, and control within their environment. Since the full moon is easily observable, it is understandable for a crisis center worker or law enforcement professional to engage in bias every time he or she looks up into the night sky (Dowling, 2005). Seeking an excuse for their irrational behavior, the individual might blame it on the moon. Although this version of the self-fulfilling prophecy has not been tested, Angus (1973) examined relations between lunar beliefs and vigilance in a psychiatric setting. Nurses in Angus's study were assigned to five groups on the basis of their responses to a scale that assessed their belief in lunar effects. When Angus later

examined ward notes, she found that nurses who believed in lunar influences were no more likely to recorded unusual occurrences on full-moon nights than those who did not. Rather than rely upon self-fulfilling prophecy, advocates of the lunar hypothesis have attempted to link phases of the moon to a number of environmental factors including moonlight, weather, gravity, electromagnetic forces, and air ions (Rotton & Kelly, 1985).

In 1986, Rotton, Kelly, & Elortegui performed another study examining beliefs. They hypothesized that police officers and psychiatric workers would have a greater belief in the lunar effect than the general population. They surveyed police officers, psychiatric workers, and other civilians in a convenience -based sampling. The authors reported their results utilizing a 2x3 factorial design that compared data among the male and female respondents as well as the police officers and psychiatric workers. The results showed that police officers, in general, had a greater belief in the effects of the synodic cycle on human behavior than civilians or psychiatric workers.

Vance (1995) sent questionnaires out to 325 recruited by sociology students ranging in ages from 16 to 75. The respondents were asked a series of forced-choice questions about beliefs and opinions on various topics, including two on the lunar phenomenon. Responses were then coded according to education, occupation, and gender. Analysis showed that 140 respondents marked yes to one or both statements, “I think the moon makes some people act weird or crazy” and “I believe people act up during full moon.” Characteristics of the people who responded were tallied by their belief about lunar influence on human behavior. No association was noted for sex, age, and education; however, those in specific occupations were more likely to accept or reject the lunacy belief. Specifically, of all the 26 mental health workers surveyed, 21 (81%) adhered towards the lunar belief. It appeared that mental health professionals, health-care workers, and clerical personnel more readily accepted the lunar effect belief than respondents in

education, students, and unemployed persons. Blue-collar workers and those in business were equally divided.

Ann Snelson (2004) studied the extent of nurses working in the city believed in the lunar effect by use of the BILE instrument. 120 nurses working in Accident and Emergency, two psychiatric inpatient wards, and four community mental health teams were sent surveys. The resulting convenience sample comprised of the nurses who returned completed questionnaires, 49 out of the 120 nurses. The sample expressed a range of beliefs concerning the lunar effect; its effect on behavior and its implications on their feelings about work. Respondents from Accident and Emergency (A&E) and the two acute inpatient wards scored significantly higher BILE scores than the respondents from the community mental health teams, indicating that they held a stronger belief in the lunar effect. There was no significant differences in BILE scores associated with either gender or length of nursing experience. Respondents who attributed behavioral changes to the lunar effect had significantly higher BILE scores than those who did not make such attributions. A statistically significant correlation between respondents' BILE scores and their work place was demonstrated. Ward and A&E nurses demonstrated a significantly stronger belief in the lunar effect than nurses in the community mental health team. A statistically significant correlation was demonstrated between BILE scores and: (a) awareness of the lunar hypothesis; (b) reported observation of behavioral change; (c) feelings about work; and (d) sources of information about the lunar effect. No statistical correlation was demonstrated between BILE scores and (a) gender, (b) length of nursing experience, (c) self-assessed knowledge of lunar phase or (d) actual knowledge of lunar phase.

Jorgenson (1981) found that individuals with an external locus of control were more likely to attribute their own behavior and that of others to lunar influences than those with an

internal locus of control. The ‘attribution theory’ states that a belief that occurrence of crises can be predicted provides individuals with feelings of control which reduce anxiety (Kelley, 1967). Therefore, the belief that the incidence of crises is correlated with lunar phase provides the worker with a sense of control and alleviates anxiety (Wilson & Tobacyk, 1990). Vance (1995) suggests that adherence to believing in the lunar effect among those working in psychiatry is due to their desire to reduce job-related anxiety created by exposure to random stressful stimuli, such as behavioral outbursts. By associating stressors with salient environmental cues, such as the moon, anxiety diminishes. Additionally, craziness clusters around uncontrollable elements which jeopardize our wellbeing and superstitious beliefs offer an explanation that makes such difficulties easier to accept (Vinson 1999). Guttierrez-Garcia and Tussell (1997) suggest that the professionals who believe in the lunar effect play an influential role in its dissemination on account of their professional status. Individuals' expectations and selective perceptions, as well as cognitive bias, selective exposure and self-fulfilling prophesy reinforce the belief (Kelly, Rotton, Culver, 1986). In fact, Danzl (1987) suggests that belief in the lunar effect has become a self-fulfilling prophecy in emergency medicine. If staff believes that a full moon instigates criminal behavior, they might be more vigilant and stricter during a full moon, which could be considered a self-fulfilling prophecy (Frey, Rotton, Barry, 1979). By ruling out the predictive effectiveness of the lunar cycle, researchers can reorient and reeducate both professional and lay people about any possible emotional or behavioral effects of the full moon. They can stimulate thought and discussion about more realistic and practical factors and their implications for prevention and treatment.

Summary

These brief literary citations help to illustrate the continued legacy of the lunar hypothesis. It is apparent that despite the continued effort of researchers, this particular belief is one that will continue to rise and fall nightly with the moon. Throughout the years, scientists and researchers have worked to prove and disprove the lunar theory. Most research has not shown statistical significance between behavior and the full moon. If it did, it was likely due to Type I errors or poor methodology. Researchers have branched out and begun to look at people's beliefs in the full moon effects on behavior. Many positive studies of participants in social service settings have shown significance, or higher than expected numbers of those who agree. Researchers are now trying to disprove those theories as to why significance would be shown. If one believes that during a full moon there is an increase in accidents, one will notice when accidents occur during a full moon, but be inattentive to the moon when accidents occur at other times. If something strange happens and there is a full moon at the time, a causal connection will be assumed. If something strange happens and there is no full moon, no connection is made, but the event is not seen as counterevidence to the belief in full moon causality. Memories get selective, and perhaps even distorted, to favor a full moon hypothesis. A tendency to do this over time strengthens one's belief in the relationship between the full moon and a host of unrelated effects.

Chapter 3

Methodology

The purpose of this study was to determine the extent to which people working in different social service settings believe in the lunar effect through the use of the Belief in Lunar Effects (BILE) instrument. It also determined whether there was significant differences in the BILE scores between the social service setting groups. A survey combining the BILE instrument with a qualitative aspect, in which participants were given space to include their opinions on the subject was also employed. This chapter will first describe the setting and participants studied. Second, an explanation on the instrument used and procedures will be discussed, and will conclude with a description of the process used to gather and analyze the data.

Setting and Participants

This study was conducted at facilities that are within a 30 mile radius of the researcher's home which provided similar community values and norms for the professional groups selected. This geographical limitation provide a better basis for comparison of the groups. Participants were included if they were certified teachers in Mt. Iron Buhl School District (712) Mesabi Academy juvenile facility, Eveleth-Gilbert School District (2154) Franklin Elementary, St. Michaels Nursing Home professional staff, 911 dispatchers for northern St. Louis County, emergency room professional personnel at Cook Hospital, and trained police officers at the Virginia Police station.

The researcher submitted an application for Institutional Review Board (IRB) approval. The IRB: Human Subjects Committee determined that the referenced study is exempt from review under federal guidelines 45 CFR Part 46.101 (b) category #2, (see Appendix A). A blank

copy of the Consent Form is included (Appendix B). Letters of consent were also received from the individual site administrators (Appendix C).

Recruitment at the cooperating sites was done by a notice posted by the researcher inviting potential participants to a short informational meeting explaining the research project. At that time there was a brief explanation of the study which included: (a) participation was voluntary and not required; (b) explanation of confidentiality of materials and data gathering; (c) no names or personally identifying information was to be gathered on the subjects; (d) potential benefits and any risks involved; and (e) consent form requirements and explanation. Any questions or concerns regarding this study was answered by the researcher. The personnel who attended the short informational meeting at the individual settings were given the option to fill out the survey or not.

Instruments

All subjects involved were given the Belief in Lunar Effects survey. A survey combining the Belief in Lunar Effect (BILE) instrument (Rotton and Kelly 1985) with a qualitative aspect, in which participants were given space to include their opinions on the subject, was employed. This combination of qualitative and quantitative methods employs triangulation which strengthens confidence in the findings and, therefore, increases the validity of results of small scale research (Atkins 1984). Respondents' demographic data were gathered at the beginning of the questionnaire. They were asked their profession, number of years in profession, gender, age, and the highest degree completed. Questions in the BILE survey were (a) Lunar phases play an important role in human affairs; (b) There is some truth to the idea that “crazies” come out when the moon is full; (c) Some people behave strangely when the moon is full; (d) I have never felt that the moon affects my behavior; (e) It is a good idea to stay at home when the moon is full; (f)

My own behavior is affected by phases of the moon; (g) A full moon can trigger violence and aggression; (h) There is absolutely no relationship between phases of the moon and behavior; and (i) Only superstitious people believe that a full moon influences behavior. Return rates were (a) Mesabi Academy juvenile facility 12 out of 14, 86%; (b) Eveleth-Gilbert School District 19 out of 27, 70%; (c) St. Michael's Nursing Home staff 21 out of 30, 70%; (d) 911 dispatcher for northern Saint Louis County four out of eight, 50%; (e) emergency room staff from Cook Hospital 11 out of 25, 44%; and (f) police department staff from the city of Virginia 4 out of 15, 27%. Of the 119 surveys distributed, 71 were returned.

Data gathering and Analysis

Frequencies, means, and standard deviations were calculated for the responses given to each question. Calculation of BILE scores was done by respondents circling a number from 1-9, where 1 represented strong disagreement, 5—a neutral opinion, and 9-strong agreement with the statement. BILE scores were produced for each participant by adding up responses to the BILE test questions and a score assigned. A total of 45 indicated impartial belief, 9-26 strong disbelief, 27-44 disbelief, 46-63 belief and 64-81 strong belief in the lunar effect. A series of ANOVAs were conducted to evaluate the relationships between BILE scores and respondents' (a) gender; (b) occupation; (c) degree area of practice; (d) age group; and (e) years of experience. The dependent variable was the BILE score and the independent variables or factors were as described in a-e above. The level of significance was set at the customary ($p=0.05$) level. The statements and opinions given in the free text were subject to analysis and coding to enable themes to emerge concerning participants' views and opinions, as described by Atkins (1984).

Summary

Participants from six different social service settings agreed to participate in completion of the BILE survey, along with voicing their opinion on the questions if they desired to determine if themes would emerge. Demographic information was also collected to be used. Significance will be looked for amongst the different settings, as well as the length of time in their positions, degree area of practice, gender, and the participant's age.

CHAPTER FOUR

Findings

The specific research question in this study was to determine if individuals working in different social service settings believe in the lunar effect through use of the Belief in Lunar Effect (BILE) instrument. To answer this question, surveys were distributed to six different social service settings in both a qualitative and quantitative aspect for data collection.

Results

Due to the amount of data collected, separate graphs were made for each category of the variables (Tables 2-6). Another graph (Table 1) was made for the descriptive statistics of the total respondents (N=71) to show the percentage for males and females, the individual occupations, and the types of degrees the respondents held. Finally, the respondent's ages and years of experience were grouped into categories and the mean and standard deviation were then found. More females 76.1%, than males 23.9%, completed the survey. This was not surprising considering most of the occupations that were surveyed are female dominated, with the exception of police officers. The two degrees that were the most common amongst the respondents were a technical degree (which could be either a one or two year) and a bachelor's degree. No one who responded had higher than a master's degree. The nursing home had the highest percentage of respondents with 29.6%, followed by the elementary school 26.8%, juvenile facility 16.9%, and emergency room 15.5%. 911 dispatchers and police officers both had 5.6% respond. The age groups were relatively uniform when grouped. The 18-25 and 50-62 age groups were both represented by 34.8%. The 36-49 age cluster was 30.4% of the entire group. The mean age was 40.75 and the standard deviation was 12.28. The last descriptive statistics was the years of experience. They were grouped into 1-5 years of experience at 32.4%,

6-15 years 35.2%, and 16-37 years was 32.4% of the respondents. The mean years of experience was 12.23 years and the standard deviation was 9.70 years.

Table 1

Demographic Variables (N=71)

		Frequency	Percent (%)
Gender	**Female**	**54**	**76.1**
	Male	**17**	**23.9**
Degree	**HS**	**7**	**9.9**
	Tech	**25**	**35.2**
	BA	**24**	**33.8**
	MA	**10**	**14.1**
	Higher	**0**	**0.0**
	Other	**5**	**7.0**
Occupation	**Police**	**4**	**5.6**
	Nursing Home	**21**	**29.6**
	ER	**11**	**15.5**
	School	**19**	**26.8**
	Juvenile	**12**	**16.9**
	911	**4**	**5.6**
Age Group	**18-25**	**24**	**34.8**
	36-49	**21**	**30.4**
	50-62	**24**	**34.8**
	Mean	**40.75**	
	(SD)	**(12.28)**	
Yrs Experiet	**1-5 years**	**23**	**32.4**
	6-15 years	**25**	**35.2**
	16-37 years	**23**	**32.4**
	Mean	**12.23**	
	(SD)	**(9.70)**	

Table 2 used a t-test to compare males (14) and females (57) on the nine item Belief in Lunar Effect Survey for significance. For all tests, p-level means statistical significance level, where p<-05 is significant. The only level that showed significance was item 6, my own behavior is affected by phases of the moon. Women believe more strongly than men that their own behavior is affected by the moon.

Table 2

Group Comparisons by Gender

items	Gender	Mean	SD	*t* -value	p-level
1. Lunar phases play an important role in human affairs	Female	6.70	(2.03)	1.27	0.22
	Male	5.76	(2.84)		
2. There is some truth to the idea that "crazies" come out when the moon is full	Female	7.22	(2.00)	1.31	0.21
	Male	6.24	(2.91)		
3. Some people behave strangely when the moon is full	Female	7.46	(1.84)	1.87	0.08
	Male	6.12	(2.78)		
4. I have never felt that the moon affects my behavior	Female	5.30	(2.74)	-0.90	0.37
	Male	6.00	(3.02)		
5. It is a good idea to stay at home when the moon is full	Female	2.50	(2.01)	0.67	0.51
	Male	2.12	(2.23)		
6. My own behavior is affected by phases of the moon	Female	3.76	(2.26)	2.24	0.03
	Male	2.41	(1.81)		
7. A full moon can trigger violence and aggression	Female	6.28	(2.04)	1.76	0.08
	Male	5.24	(2-41)		
8. There is absolutely no relationship between phases of the moon and behavior	Female	3.13	(2.41)	-1.87	0.07
	Male	4.41	(2.65)		
9. Only superstitious people believe that a full moon influences	Female	3.26	(2.32)	-1.63	0.11
	Male	4.35	(2.69)		
Item Total	Female	45.61	(6.98)	1.41	0.16
	Male	42.65	(9.19)		

Sample Size: Female (n=57), Male (n=14)

Tables 3, 4, 5, and 6 used an ANOVA that used F statistics to compare three or more groups. For all tests, p-level means statistical significance level, where p<.05 is significant. Table 3 was comparisons by occupation. The six occupations were compared for the individual BILE questions. Significance was shown on question 2, 3, and 8. When a post-poc comparison was done to determine which occupations showed significance, only question 2 was significant. Question 2 revealed that respondents working in the emergency room believe more strongly than those in the juvenile facility that there is some truth to the idea that the "crazies" come out when the moon is full.

Table 3

Comparisons by Occupation

items	Occupation	Mean	(SD)	F-value	*p* -level	Post-hoc comparisons
1. Lunar phases play an important role in human affairs	Police	5.50	(3.42)	1.57	0.18	
	Nursing Home	7.05	(2.06)			
	ER	7.64	(1.75)			
	Scool Teachers	6.00	(1.97)			
	Juvenile	5.83	(2.41)			
	911	5.50	(3-42)			
2. There is some truth to the idea that "crazies" come out when the moon is full	Police	8.50	(0.58)	3.58	0.01	ER>Juvenile
	Nursing Home	7.43	(2.11)			
	ER	8.55	(0.69)			
	Scool Teachers	6.47	(2.01)			
	Juvenile	5.58	(2.68)			
	911	5.50	(3.42)			
3. Some people behave strangely when the moon is full	Police	8.00	(0.82)	2.42	0.05	none
	Nursing Home	7.48	(2.21)			
	ER	8.55	(0.69)			
	Scool Teachers	6.74	(2.02)			
	Juvenile	6.08	(2.31)			
	911	5.75	(3.59)			
4. I have never felt that the moon affects my behavior	Police	4.75	(3.10)	0.71	0.62	
	Nursing Home	4.81	(2.84)			
	ER	5.00	(2.61)			
	Scool Teachers	6.16	(2.67)			
	Juvenile	6.17	(2.98)			
	911	5.50	(3.51)			
5. It is a good idea to stay at home when the moon is full	Police	4.00	(3.83)	1.55	0.19	
	Nursing Home	2.62	(1.96)			
	ER	3.00	(2.45)			
	Scool Teachers	1.74	(1.41)			
	Juvenile	1.75	(1.77)			
	911	3.25	(2.06)			
6. My own behavior is affected by phases of the moon	Police	2.25	(1.89)	0.33	0.89	
	Nursing Home	3.76	(2.51)			
	ER	3.36	(2.25)			
	Scool Teachers	3.53	(2.32)			
	Juvenile	3.25	(1.91)			
	911	3.25	(2.06)			
7. A full moon can trigger violence and aggression	Police	5.75	(2.63)	1.93	0.10	
	Nursing Home	6.19	(2.11)			
	ER	7.64	(1.57)			
	Scool Teachers	5.63	(1.89)			
	Juvenile	5.17	(2.21)			
	911	5.50	(3.32)			
8. There is absolutely no relationship between phases of the moon and behavior	Police	5.50	(2.65)	2.68	0.03	none
	Nursing Home	2.48	(2.25)			
	ER	2.36	(1.91)			
	Scool Teachers	3.63	(2.19)			
	Juvenile	4.58	(2.54)			
	911	5.00	(4.08)			
9. Only superstitious people believe that a full moon influence	Police	4.50	(3.11)	1.37	0.25	
	Nursing Home	2.76	(2.05)			
	ER	2.64	(1.75)			
	Scool Teachers	4.05	(2.61)			
	Juvenile	4.08	(2.61)			
	911	4.75	(3.40)			
Item Total	Police	48.75	(10.75)	1.09	0.38	
	Nursing Home	44.57	(9.81)			
	ER	48.73	(4.34)			
	Scool Teachers	43.95	(5.83)			
	Juvenile	42.50	(6.59)			
	911	44.00	(7.96)			

*Bonferroni was used for the post-hoc comparisons

Table 4 was comparisons by degree. The five degree areas were compared for the individual BILE questions. Significance was shown on question 2, 3, and 7. When a Bonferroni post-poc comparison was done to determine which degrees showed significance, questions 2 and 3 were significant. Question 2 revealed that respondents with a technical degree believe more strongly than those with a master's degree that there is some truth to the idea that the "crazies" come out when the moon is full. Question 3, some people behave strangely when the moon is full, is believed more by those with a technical degree than those with a bachelor's degree. Lastly, question 7, a full moon can trigger violence and aggression, is believed more by those with a technical degree compared to those with a master's or bachelor's degree.

Table 4

Comparisons by Degree

items	Degree	Mean	SD	F-\alue	p-le\el	Post-hoc comparisons*
1. **Lunar phases play an important role in human affairs**	HS	**6.57**	**(2.64)**	**1.53**	**0.20**	
	Tech	**7.32**	**(1.80)**			
	BA	**5.83**	**(2.22)**			
	MA	**6.10**	**(2.47)**			
	Other	**6.00**	**(3.16)**			
2. There is some truth to the idea that "crazies" come out when the moon is full	HS	**7.43**	**(2.07)**	**3.43**	0.01	Tech> MA
	Tech	**8.08**	**(1.08)**			
	BA	**6.46**	**(2.41)**			
	MA	**5.50**	**(2.64)**			
	Other	**6.40**	**(3.44)**			
3. Some people behave strangely when the moon is full	HS	**7.00**	**(2.45)**	**3.22**	0.02	Tech>BA
	Tech	**8.28**	**(0.84)**			
	BA	**6.58**	**(2.32)**			
	MA	**6.20**	**(2.44)**			
	Other	**6.20**	**(3.27)**			
4. I have never felt that the moon affects my behavior	HS	**4.00**	**(3.27)**	**0.72**	**0.58**	
	Tech	**5.28**	**(2.35)**			
	BA	**5.96**	**(2.85)**			
	MA	**5.80**	**(3.29)**			
	Other	**5.40**	**(3.36)**			
5. It is a good idea to stay at home when the moon is full	HS	**2.00**	**(1.73)**	**1.19**	**0.32**	
	Tech	**2.64**	**(2.08)**			
	BA	**2.46**	**(2.25)**			
	MA	**1.40**	**(1.27)**			
	Other	**3.60**	**(2.41)**			
6. My own behavior is affected by phases of the moon	HS	**3.57**	**(2.57)**	**0.50**	**0.73**	
	Tech	**3.84**	**(2.32)**			
	BA	**2.96**	**(2.05)**			
	MA	**3.60**	**(2.32)**			
	Other	**3.20**	**(2.28)**			
7. A full moon can trigger violence and aggression	HS	**5.43**	**(1.72)**	**3.70**	0.01	Tech>BA
	Tech	**7.24**	**(1.51)**			Tech>MA
	BA	**5.38**	(2.22)			
	MA	**5.00**	**(2.16)**			
	Other	**6.00**	**(3.16)**			
8. There is absolutely no relationship between phases of the moon and behavior	HS	**2.43**	**(1.90)**	**1.17**	**0.33**	
	Tech	**2.84**	**(2.36)**			
	BA	**3.96**	**(2.44)**			
	MA	**3.90**	**(2.64)**			
	Other	**4.40**	**(3.78)**			
9. **Only superstitious people believe that a full moon influences**	HS	**3.00**	**(2.08)**	**2.41**	**0.06**	
	Tech	**2.52**	**(1.71)**			
	BA	**4.29**	**(2.71)**			
	MA	**3.80**	**(2.57)**			
	Other	**5.00**	**(3.08)**			
Item Total	HS	**41.43**	**(10.21)**	**2.29**	**0.07**	
	Tech	**48.04**	**(7.04)**			
	BA	**43.88**	**(5.48)**			
	MA	**41.30**	**(8.04)**			
	Other	**46.20**	**(10.83)**			

***Bonf'erroni was used for the post-hoc comparisons**

Table 5

Comparisons by Age Group

items	Age Group	Mean	SD	F-value	*p* -level
1. Lunar phases play an important role in human affairs	**18-35**	**6.67**	**(2.14)**	**0.03**	**0.97**
	36-49	**6.52**	**(2.44)**		
	50-62	**6.54**	**(2.09)**		
2. There is some truth to the idea that "crazies" come out when the moon is full	**18-35**	**6.96**	**(2.39)**	**0.13**	**0.88**
	36-49	**7.29**	**(2.05)**		
	50-62	**7.08**	**(2.10)**		
3. Some people behave strangely when the moon is full	**18-35**	**6.75**	**(2.36)**	**1.17**	**0.32**
	36-49	**7.48**	**(1.97)**		
	50-62	**7.58**	**(1.72)**		
4. I have never felt that the moon affects my behavior	**18-35**	**5.25**	**(2.54)**	**0.05**	**0.95**
	36-49	**5.52**	**(2.77)**		
	50-62	**5.38**	**(3.15)**		
5. It is a good idea to stay at home when the moon is full	**18-35**	**2.75**	**(2.23)**	**0.92**	**0.41**
	36-49	**2.48**	**(2.34)**		
	50-62	**1.96**	**(1.55)**		
6. My own behavior is affected by phases of the moon	**18-35**	**3.63**	**(2.24)**	**0.13**	**0.88**
	36-49	**3.43**	**(1.99)**		
	50-62	**3.29**	**(2.48)**		
7. A full moon can trigger violence and aggression	**18-35**	**5.79**	**(2.28)**	**0.80**	**0.45**
	36-49	**6.00**	**(2.24)**		
	50-62	**6.54**	**(1.79)**		
8. There is absolutely no relationship between phases of the moon and behavior	**18-35**	**3.33**	**(2.10)**	**0.25**	**0.78**
	36-49	**3.00**	**(2.43)**		
	50-62	**3.50**	**(2.69)**		
9. Only superstitious people believe that a full moon influences behavior.	**18-35**	**3.63**	**(1.97)**	**0.35**	**0.71**
	36-49	**3.52**	**(2.79)**		
	50-62	**3.08**	**(2.38)**		
Item Total	**18-35**	**44.75**	**(8.25)**	**0.02**	**0.98**
	36-49	**45.24**	**(7.46)**		
	50-62	**44.96**	**(7.15)**		

Sample size: 18-35 years old (n=24), 36-49 years old (n=21), 50-62 years (n=24)

Table 5 was comparisons by age group. The ages of the respondents were clustered into three equally uniform numbered groups. The 18-25 and 50-62 age groups were both characterized by 34.8%. The 36-49 age group was 30.4% of the group. The mean age was 40.75. The three age groups were compared against the individual BILE questions. Significance was not found for any of the questions.

Table 6

Comparisons by Years of Experience

items	Yrs Experience	Mean	SD	F-value	*p*-level
1. Lunar phases play an important role in human affairs	**1-5**	**6.74**	**(2.12)**	**0.64**	**0.53**
	6-15	**6.64**	**(2.41)**		
	16-37	**6.04**	**(2.27)**		
2. There is some truth to the idea that "crazies" come out when	**1-5**	**6.83**	**(2.31)**	**0.14**	**0.87**
the moon is full	**6-15**	**6.96**	**(2.65)**		
	16-37	**7.17**	**(1.80)**		
3. Some people behave strangely when the moon is full	**1-5**	**6.61**	**(2.19)**	**1.17**	**0.32**
	6-15	**7.24**	**(2.44)**		
	16-37	**7.57**	**(1.75)**		
4. I have never felt that the moon affects my behavior	**1-5**	**5.26**	**(2.88)**	**0.09**	**0.91**
	6-15	**5.60**	**(2.71)**		
	16-37	**5.52**	**(2.94)**		
5. It is a good idea to stay at home when the moon is full	**1-5**	**3.00**	**(2.26)**	**1.79**	**0.17**
	6-15	**2.36**	**(2.18)**		
	16-37	**1.87**	**(1.58)**		
6. My own behavior is affected by phases of the moon	**1-5**	**3.91**	**(2.15)**	**0.79**	**0.46**
	6-15	**3.16**	**(2.19)**		
	16-37	**3.26**	**(2.34)**		
7. A full moon can trigger violence and aggression	**1-5**	**5.61**	**(2.04)**	**0.63**	**0.53**
	6-15	**6.24**	**(2.39)**		
	16-37	**6.22**	**(2.07)**		
8. There is absolutely no relationship between phases of the	**1-5**	**3.57**	**(2.33)**	**0.13**	**0.88**
moon and behavior	**6-15**	**3.52**	**(2.73)**		
	16-37	**3.22**	**(2.54)**		
9. Only superstitious people believe that a full moon influences b	**1-5**	**3.70**	**(2.23)**	**0.26**	**0.77**
	6-15	**3.64**	**(2.53)**		
	16-37	**3.22**	**(2.61)**		
Item Total	**1-5**	**45.22**	**(8.96)**	**0.19**	**0.83**
	6-15	**45.36**	**(7.14)**		
	16-37	**44.09**	**(6.87)**		

Sample size: 1-5 years (n=23), 6-15 years (n=25), 16-37 years (n=23)

Table 6 was comparisons by years of experience. They were gathered into 1-5 years of experience 32.4%, 6-15 years 35.2%, and 16-37 years with 32.4% of the respondents. The mean years of experience was 12.23 years. The years of experience groups were compared against the individual BILE questions. Significance was not shown for any of the questions.

The qualitative data was also looked at to determine possible themes within those willing to respond. 23 of the 71 respondents (32%) gave additional information, which was categorized according to subject content.

The first theme noted is behavioral changes: Referring to the idea that "crazies" come out when the moon is full, individuals working in the Emergency Room reported: "Have seen this many times on our ER" and "Many end up in our ER." A police officer reported that, "Call volume seems to increase during this period." Additionally, "I have seen it (violence and aggression) throughout different continuums of care as well (e.g., assisted living, memory care, a skilled nursing facility, and hospital)." "In the long term care, we see more behaviors during the few days before the full moon," nursing home staff. Specific changes were also reported, for example: "It affects my sleep-I don't sleep very well; wake up often," juvenile resident staff. A teacher reported lack of concentration and memory, and increased hyperactivity in the students. Another teacher said, "Decreased concentration," and "can't sleep," for herself. An emergency room staff declared, "I worked at the state hospital and two days before, the day of, and two days after a full moon, psych patients have an increase in behaviors!!"

There is evidence of concern for using the moon as an excuse for behavior in some respondents' comments. For example: "Depends on a person's individual internal body system," juvenile resident staff. "Violence does not need a moon," nursing home staff. "Somewhat also depends on a person's personality, chemical makeup in brain cycle, body cycles, and tides," juvenile resident staff. "I think people fool themselves," nursing home staff. Finally, a nursing home staff acknowledged, "Depends on the mental stability of the subject."

Feelings about work were found: "When we get weird calls or it's busy we look at the calendar and usually it's a fully moon or close to it," 911 dispatcher. Methods of belief

formation, continuation, and dispersion observed changes at the work place, were cited by several respondents as evidence that the moon is exerting its influence. For example: “There is also an increase in use of restraints at a psych hospital during a full moon,” emergency room staff.

Discussion

The vast majority of studies have discredited the belief in the relationship between lunar phase and human behavior (Campbell & Beets, 1978, Kelly, Rotton, & Culver, 1986, Rotton & Kelly 1985, Owens et al. 1998, and Frey et al. 1979). As a result, researchers began to explore the beliefs of those working in different settings and how they compare using the BILE. Rotton and Kelly (1985) conducted a questionnaire on paranormal phenomena and based on the BILE scale about 47% recorded greater belief than disbelief in lunar effects. Russell and Dua (1983) found that 45% of 402 students taking introductory psychology at a Canadian university endorsed an item indicative of general belief in lunar influences. Wilson and Tobacyk (1990) also used the BILE survey to measure the perceptions of employees at a crisis center regarding the beliefs in the lunar effect compared to a control group of college students. The results indicated that the crisis center workers’ beliefs that the moon affected human behavior were significantly higher than those of the control group of the college students. In 1986, Rotton, Kelly, & Elortegui performed another study examining beliefs and the results showed that police officers, in general, had a greater belief in the effects of the synodic cycle on human behavior than civilians or psychiatric workers. These studies support the results that individuals do have a belief in the full moon effecting behavior. Snelson (2004) had no significant differences in BILE scores associated with either gender or length of nursing experience. This study is consistent

with lack of significance in length of experience, but not gender when comparing to the results of the current study.

Vance (1995) suggests that adherence to believing in the lunar effect among those working in psychiatry is due to their desire to reduce job-related anxiety created by exposure to random stressful stimuli, such as behavioral outbursts. By associating stressors with salient environmental cues, such as the moon, anxiety diminishes.

Summary

The results from the surveys distributed to six different social service settings showed only a few individual questions on the BILE as significant, not entire categories as discussed in the literature reviewed. Areas compared against in women against men, occupations, and degrees showed significance. The areas of age and years of experience were unable to show any type of significance. The qualitative data showed themes expressed with behavioral changes, concern for justification in behavior due to the moon, feelings regarding work, and continuation of belief in the full moon.

CHAPTER FIVE

Summary and Conclusions

This study studied the extent of individuals working in different social service settings believed in the lunar effect by use of the BILE instrument. The sample expressed a range of beliefs concerning the lunar effect; its effect on behavior, and its implications on their feelings about work. As many others before have noted, people's beliefs about the lunar influences continue to illustrate merit of a study in their own class. The case of relevancy proven lies within the fact that beliefs create expectations, which in turn, are supposed to create our interpersonal beliefs that we carry out on a daily basis.

Summary of the Research and Findings

If a person is to say have a bad experience working during a full moon with a "client", then that individual may remember the full moon as the cause of the behavior instead of any of the cause that could have premeditated up to the unfamiliar behavior of the client. The moon was the observable behavior that they attributed for the behavior. The individual now has a bias every time he or she looks up into the night sky, which is perception bias. Although numerous studies have discontinued the lunar hypothesis, the belief is still widely established and has continued to impact the decision-making of those who linger on to the belief. Continuance in that belief may unconsciously impair the judgment of social service setting workers, although the extent to which is unknown. This study was able to show significance that women more than men believe their own behavior is affected by the moon. The question of that "crazies" come out at a full moon is believed more by those working in an emergency room more than a juvenile facility. It is also believed more by those holding a technical degree than those with a master's degree. Significance was also found in the question that people behave strangely when the moon

is full by individuals with a technical degree compared to those with a bachelor's degree. Finally, significance was also found in that the full moon triggers violence and aggressions being believed more by those with a technical degree more than those with a master's or bachelor's degree.

Implications for professional practice

This study indicates that a proportion of staff hold a belief in the lunar effect. The implications at the individual sites may vary, but there could be a motive for staff receiving support in managing stress they feel when on the job. For example, if police officers believe that a full moon instigates criminal behavior, they might be more vigilant and make more arrests during a full moon (which is a self-fulfilling prophecy). Teachers could also behave in the same manner, by believing that the behavior of the student is due to full moon and not to a different variable that could be controlled if the student was given the proper crisis intervention. If two educational staff share this belief in the full moon they might continue to ignore (a) the validity of the behavior for the week, (b) the generalizability of incident reports obtained throughout the year, (c) different ways of analyzing the data for the true meaning, and (d) the differences between violent and petty behavior. On-site trainings can also be done to lower the expectancy of behavior during a full moon. If an individual is taught that no relationship exists, then any unintentional or intentional behavior towards individuals based solely on the reason for a full moon should be eliminated. Education should include evidence base data relating to the lunar effect.

Recommendations for Future Research

If researcher continue to want to show support for the lunar hypothesis, studies should emphasis examining lunar-behavioral data that has many observations for each period with a time series to derive a more accurate conclusion, thereby trying to avoid Type I errors that have disputed the previous results of significance. Future studies should focus on why the belief in the lunar effect exists and how it influences the individual professions that serve the public. Implications on these beliefs and the individual's decision making and management in their setting can be explored. Replication studies on beliefs could continue to be done with larger sample sizes in both rural and urban areas.

Furthermore, the actual definition of 'lunacy' is one point that has never been truly agreed upon and until the actual dysfunction or a disorder is defined, how can researchers know what to look for in order to conduct studies to prove significance.

Conclusion

It could be a selective memory or a self-fulfilling prophecy that is the foundation behind the persistent lunar theory. Do we see a full moon and believe it is a green light for bad behavior or do we laugh off the superstition to folklore? Countless studies have continued to pursue the lunacy behind the lunar effects of the full moon to give meaning to a reason for the rise in behaviors or incidents. Researchers have most confirmed a lack of significance in the full moon and its effect on behavior. Despite that, a belief in lunar effects continues to rise and fall just as the moon does in in the night sky. For as long as people are behaving badly, the moon and its effects will be blamed.

References

Angus, M. D. (1973). The rejection of two explanations of belief in a lunar influence on behavior. Unpublished master's thesis. Simon Fraser University, Burnaby, British Colombia, Canada.

Atkins, M. J. (1984) Practitioner as researcher: some techniques for analyzing semi-structured data in small-scale research. *British Journal of Educational Studies,* 32(3), 215-261.

Campbell, D. E. (1982). Lunar-lunacy research: When enough is enough. *Environment and Behavior,* 14-4,418-424.

Campbell, D. E. & Beets, J. L. (1978). Lunacy and the full moon. *Psychological Bulletin,* 85, 1123-1129.

Chapman, L. J. (1967). Illusory correlation in observational report. *Journal of Verbal Learning and Verbal Behavior,* 6, 151-155.

Cohen-Mansfield, J., Marx, M. S., & Werner, P. (1989). Full moon: does it influence agitated nursing home residents? *Journal of Clinical Psychology*, 45(4), 611-614.

Culver R., Rotton, J., &, Kelly, I. W. (1988). Moon Mechanisms and myths: a critical appraisal of explanations of purported lunar effects on human behavior. *Psychological Reports,* 62, 683-710.

Danzl, D. F. (1987). Lunacy. *Journal of Emergency Medicine,* 5, 91-95.

Dingman, H. F., Cleland, C. C., & Swartz, J. D. (1970). Institutional "wisdom" as expressed through folklore. *Mental Retardation,* 8(12), 2-8.

Dowling, K. W. (2005). The effect of lunar phases on domestic violence incident rates. *The Forensic Examiner,* 14(4), 13-18.

Frey, J., Rotton, J., Barry, T. (1979). The effects of the full moon on human behavior: Yet another failure to replicate. *The Journal of Psychology,* 103, 159-163.

Gardner, C. (1981). Moonstruck. *Nursing Times,* 87, 40-42.

Gorvin, J., & Roberts, S. (1994). Lunar phases and psychiatric hospital admissions. *Psychological Reports,* 75, 1435-1440.

Guttierrez-Garcia J. M., Tussell, F. (1997). Suicides and the lunar cycle. *Psychological Reports.* 80, 243-250.

Jorgenson, D. O. (1981). Locus of control and the perceived casual influence of the lunar cycle. *Perceptual and Motor Skills,* 52, 864.

Kelly, H. H. (1967). Attribution theory in social psychology. In D. Levine (Ed.) *Nebraska Symposium on Motivation* (Vol. 15, pp 192-238). Lincoln: University of Nebraska Press.

Kelly, I.W. Rotton, J., Culver, R. (1986). The moon was full and nothing happened: a review of studies on the moon and human behavior. *Skeptical Enquirer,* 10. 129-143.

Koenig, D. J., Proverbs, T. B., Clayton, D., & DeBeck, P. (1979). Lunar phases and electoral behavior. *Sociological Symposium,* 28, 62-70.

Lykken, D. T. (1968). Statistical significance in psychological research. *Psychological Bulletin,* 70, 151-159.

Lieber, A. L. (1978). The Lunar Effect: Biological Tides and Human Emotions. Garden City, NY: Doubleday.

Little, G. I., Bowers, R., & Little, L. H. (1987). Lack of relationship between moon phase and incidents of disruptive behavior in inmates with psychiatric problems. *Perceptual and Motor Skills,* 64, 1212.

Otis, L. P., & Kuo, E. C. Y. (1984). Extraordinary beliefs among students in Singapore and Canada. *Journal of Psychology,* 116, 216-226.

Owen, C., Tarantello, C., Jones, M., & Tennant, C. (1998). Lunar cycles and violent behavior. *Australian and New Zealand Journal of Psychiatry, 32, 496-499.*

McGuigan, F.J. (1978). Experimental psychology (3rd edition) Englewood Cliffs, NJ: Prentice-Hall.

Raison, C., Klein, H. M., Steckler, M. (1999). The moon and madness reconsidered. *Journal of Affective Disorders,* 53(1), 99-106.

Rosenthal, R. Interpersonal expectations: Effects of the experimenter's hypothesis. In R. Rosenthal & R .L. Rosnow (Eds.), *Artifact in behavioral research* (pp 181-277). New York: Academic Press.

Rotton J., & Kelly, I. W. (1985). Much ado about the full moon: A meta-analysis of lunar-lunacy research. *Psychological Bulletin,* 97(2), 286-306.

Rotton J., & Kelly, I. W. (1985). A scale for assessing belief in lunar effects: reliability and concurrent validity. *Psychological Report,* 57, 239-245.

Rotton J., Kelly I. W., & Elortegui, P. (1986). Assessing belief in lunar effects. Known groups validation. *Psychological Reports,* 59, 171-174.

Rotton J., Kelly I. W., & Frey, J. (1983). Geophysical variables and behavior. Detecting lunar

periodicities: something old, new, borrowed, and true. *Psychological Reports,* 52, 111-116.

Russell G. W., & Dua, M. (1983), Lunar influences on human aggression. *Social Behavior and Personality,* 11, 41-44.

Sarton, G. (1939). Lunar influences on living things. *Isis,* 30, 495-507.

Snelson, A. (2004). Under the Brighton full moon. *Mental Health Practice,* 8, 30-35.

Thompson, D.A., Adams, S.L. (1996). The Full Moon and ED patient volumes: unearthing a myth. *American Journal of Emergency Medicine,* 14, 161-164.

Vance, D. (1995). Belief in lunar effects and human behavior. *Psychological Reports,* 76, 32.

Wehr, T. (1992). In short photoperiods, human sleep is biphasic. *Journal of Sleep Research,* 1(2), 103-107.

Wilson, J. E., & Tobacyk, J J. (1990). Lunar phases and crisis center telephone calls. *The Journal of Social Psychology,* 130, 47-51.

Appendix A

TO : roul0012@umn.edu.

The IRB: Human subjects Committee determined that the referenced study is exempt from review under federal guidelines **45** CFR Part **46.101(b)** category **#2** SURVEYS/INTERVIEWS; STANDARDIZED EDUCATIONAL TESTS; OBSERVATION OF PUBLIC BEHAVIOR.

Study Number: **0903E61401**

Principal Investigator: Crystal scuffy

Title(s):
Belief in Lunar Effect

This e-mail confirmation is your official university of Minnesota RSPP notification of exemption from full committee review. You will not receive a hard copy or letter. This secure electronic notification between password protected authentications has been deemed by the University of Minnesota to constitute a legal signature.

The study number above is assigned to your research. That number and the title of your study must be used in all communication with the IRB office.

Research that involves observation can be approved under this category without obtaining consent.

SURVEY OR INTERVIEW RESEARCH APPROVED AS EXEMPT UNDER THIS CATEGORY IS LIMITED TO ADULT SUBJECTS.

This exemption is valid for five years from the date of this correspondence and will be filed inactive at that time. You will receive a notification prior to inactivation, if this research will extend beyond five years, you must submit a new application to the IRB before the study?s expiration date.

upon receipt of this email, you may begin your research, if you have questions, please call the IRB office at **(612) 626-5654.**

You may go to the view completed section of eResearch Central at http://eresearch.umn.edu/ to view further details on your study.

The IRB wishes you success with this research.

Appendix B
Beliefs in Lunar Effects Consent Form

You are invited to be in a research study of Beliefs in Lunar Effects. You were selected as a possible participant because of your current employment in a social service position. We ask that you read this form and ask any questions you may have before agreeing to be in the study. This project will focus on the belief of lunar effects of professionals working in different social service settings. We ask that you read this document and ask any questions you may have before agreeing to be in the study. This study is being conducted by: Crystal Scuffy, graduate student from the College of Education and Human Service Professions at the University of Minnesota Duluth.

Background Information:
This project will focus on the belief of lunar effects of professionals working in different social service settings. It is believed by many in social service settings that lunar cycles effect the behavior of people despite years of research that shows there is no significant relationship (Rotton J., Kelly, I.W. (1985). In 1985 J. Rotton and I.W. Kelly established a scale measuring Belief in Lunar Effects, or BILE. The nine item survey quantifiably measures the degree to which individuals believe or disbelieves in the lunar effect by adding up their responses to give a BILE score. Over the next year the researcher will collect data from six different groups (high school, elementary school, residential facility, nursing home, 9-1-1 dispatchers, emergency room personnel, and police) through a paper survey. This study will determine the extent to which professionals working in social service settings believe in the lunar effect by use of the BILE instrument. It will also determine whether there is significant difference in the BILE scores between the social service setting groups. A survey combining the Belief in Lunar Effects (BILE) instrument with a qualitative aspect, in which participants are given space to include their opinions on the subject, will also be employed. Respondent's demographic information will be gathered as well. This survey should take approximately ten minutes.

Procedure:
If you agree to be in this study, we would ask you to do the following things:
You will complete a nine item rating survey on your beliefs of lunar effects on behavior. If you would like to provide a comment for each item, there will be a space provided. Not all questions need to be answered in order to participate. Demographic information of yourself will also be collected. No personable identifying information will be needed.

Risks and Benefits of Being in the Study:
The study has no identifiable risks. The results of this study will not directly affect you or your occupation. If there is a significance in belief of the lunar effect, the anticipated benefits will be a training in how to reduce the anxiety of staff during different lunar cycles.

Compensation:
You will not receive any form of payment.

Confidentiality:
The records of this study will be kept private. Since questionnaires will ask only for gender, occupation, and age, it has been made impossible to identify subjects by name. Consent forms will be kept securely along with results for seven years after completion of this study.

Voluntary Nature of the Study Participants:
Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question or withdraw at any time with out affecting those relationships.

Contacts and Questions:
The researcher conducting this study is Crystal Scuffy , graduate student from the College of Education and Human Service Professions at the University of Minnesota Duluth. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at, 218-744-4164, or via e-mail crouleau24@hotmail.com. Faculty advisor Joyce Strand is also available for questions at 218-726-8182, or via e-mail at jstrandl@d.umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

If you decide to participate, you are free to withdraw at any time without affecting those relationships.

You will be given a copy of this form to keep for your records.

Statement of Consent:
I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature:_____
Date:

Signature of Investigator:
Date:

Appendix C